

CLAIMS

We claim:

1. An assembly for introduction into an incision and for sealing an opening in the wall of a blood vessel having a vessel wall with inner and outer wall surfaces, said assembly comprising:

a sheath arranged to be placed inside said incision and directed to the opening in the wall of the blood vessel;

an occlusion element, arranged to be inserted through said sheath into and through the opening in the wall of the blood vessel;

a retaining thread having a distal section and a proximal section, said distal section being arranged to be inserted through said sheath into and through the opening in the wall of the blood vessel, said distal section being attached to said occlusion element, said proximal section being arranged to remain proximal to the opening in the blood vessel, whereupon a portion of said retaining thread bridges the wall of the blood vessel through the opening, said retaining thread being further arranged to apply force to said occlusion element to cause the engagement of said occlusion element with the inner wall surface of the blood vessel; and

a locking element, arranged to be slidably mounted on said retaining thread to apply force to the outer wall surface of the blood vessel to produce tension in said retaining thread confined to the portion of said retaining thread bridging the wall of the blood vessel.

2. The assembly of claim 1, wherein said occlusion element and said retaining thread are resorbable.

3. The assembly of claim 2 wherein said locking element is resorbable.

4. An assembly for introduction into an incision and for sealing an opening in the wall of a blood vessel having a vessel wall with inner and outer wall surfaces, said assembly comprising;

a sheath arranged to be placed inside said incision and directed to the opening in the wall of the blood vessel;

a first resorbable segment having a distal section and a proximal section, said distal section being arranged to be inserted through said sheath into and through the opening in the wall of the blood vessel;

a second resorbable segment attached to said distal section of said first resorbable section and arranged to be inserted through said sheath into and through the opening in the wall of the blood vessel, said proximal section of said first resorbable segment being arranged to remain proximal to the opening in the wall of the blood vessel, whereupon a portion of said first resorbable segment bridges the wall of the blood vessel through the opening, said first resorbable segment being further arranged to apply force to said second resorbable segment to cause the engagement of said second resorbable segment with the inner wall surface of the blood vessel;

a third resorbable segment arranged to be slidably mounted on said first resorbable segment to apply force to the outer wall surface of the blood vessel to produce tension in said first resorbable segment confined to the portion of said first resorbable segment bridging the wall of the blood vessel.

5. The assembly of claim 4, wherein said second resorbable segment comprises an occlusion element which causes the sealing of said opening.

6. The assembly of claim 4, wherein said second resorbable segment comprises a spreadable element which causes the sealing of said opening.

7. An assembly for introduction into an incision and for sealing an opening in the wall of a blood vessel having a vessel wall with inner and outer wall surfaces, the wall having a wall thickness between the inner and outer wall surfaces, said assembly comprising;

a first member arranged to be placed inside the incision and directed to the opening in the wall of the blood vessel;

an occlusion element, arranged to be inserted through said first member into and through the opening in the wall of the blood vessel;

a retaining thread having a distal section and a proximal section, said distal section being arranged to be inserted through the first member into the opening in the wall of the blood vessel, said distal section being attached to said occlusion element, said proximal section being arranged to remain proximal to the opening in the blood vessel, whereupon a portion of said retaining thread bridges the wall thickness through the opening, with said retaining thread being further arranged to apply force to said occlusion element to cause the engagement of said occlusion element with the inner wall surface of the blood vessel; and

a locking element arranged to be slidably mounted on said retaining thread to apply force to the outer wall surface of the blood vessel to produce tension in said

retaining thread confined to the portion of said retaining thread bridging the wall thickness of the blood vessel.

8. The assembly of claim 7, wherein said occlusion element and said retaining thread are resorbable.

9. The assembly of claim 8 wherein said locking element is resorbable.

10. A bioabsorbable occlusion assembly for introduction into an incision and for sealing an opening in the wall of a blood vessel having a vessel wall with inner and outer wall surfaces, the blood vessel being located beneath the skin, said assembly comprising;

an occlusion element which is sized to be fitted through the opening in the wall of the blood vessel and to lie generally adjacent to the inner wall surface during use;

a retaining thread sized for reception in the incision and in operative connection with said occlusion element to extend proximally of the occlusion element through the incision; and

a locking element sized to be received in the incision and beneath the skin and operatively connected to and maintaining tension upon said retaining thread to retain the wall of the blood vessel between said locking element and said occlusion element during use.

11. The assembly of claim 10, wherein said occlusion element is spreadable.

12. A sealing device for percutaneously sealing a percutaneously made puncture in a blood vessel having a vessel wall with inner and outer wall surfaces, said sealing device comprising

an occlusion element which is constructed and arranged to be percutaneously inserted into the blood vessel;

a retaining thread connected to the occlusion element, said occlusion element being repositionable after insertion into the blood vessel to engage against the inner wall surface; and

a locking element constructed and arranged to be inserted percutaneously and be moved over the retaining thread toward and adjacent the outer wall surface of the blood vessel and into cooperative relation with said occlusion element to thereby seal the puncture in the blood vessel.

13. A method of sealing an incision and an opening in a blood vessel having a vessel wall with inner and outer wall surfaces creating a wall thickness between the surfaces, wherein the incision extends through the skin of a patient, and wherein the opening comprises a percutaneously made puncture in the blood vessel, said method comprising the steps of:

supplying an occlusion system comprising a first member, a first resorbable segment, a second resorbable segment, and a third resorbable segment, said first resorbable segment comprising a distal section and a proximal section, said distal section being operatively coupled to said second resorbable segment, said proximal section being arranged to remain proximal to the opening in the blood vessel;

inserting said first member into said incision and directed to the opening in the wall of the blood vessel;

inserting said first resorbable segment and said second resorbable segment through said first member into and through the opening in the wall of the blood vessel;

applying a force on said proximal section of said first resorbable segment, said force applied on said proximal section causing the engagement of said second resorbable segment with the inner wall surface of the blood vessel, whereupon a portion of said first resorbable segment bridges the wall thickness; and

sliding said third resorbable segment along said first resorbable segment to apply force to the outer wall surface of the blood vessel to produce tension in said first resorbable segment confined to the portion of said first resorbable segment bridging the wall thickness of the blood vessel.

14. The method of claim 13, wherein said second resorbable segment comprises an occlusion element which causes the sealing of the opening.

15. The method of claim 13, wherein said second resorbable segment comprises a spreadable element which causes the sealing of the opening.

16. The method claim 13, wherein said first member comprises a sheath.

17. A method of sealing an incision and an opening in a blood vessel, wherein the incision extends through the skin of a patient, and wherein the opening comprises a percutaneously made puncture in the blood vessel, the blood vessel having a vessel

wall with inner and outer wall surfaces creating a wall thickness between the surfaces, said method comprising the steps of:

supplying an occlusion system comprising a first member, a first resorbable segment, a second resorbable segment, and a third resorbable segment, said first resorbable segment comprising a distal section and a proximal section, said distal section being operatively coupled to said second resorbable segment, said proximal section being arranged to remain proximal to the opening in the blood vessel;

inserting said first member into said incision and directed to the opening in the wall of the blood vessel, wherein the insertion of said first member causes the insertion of said first resorbable segment and said second resorbable segment into and through the opening in the wall of the blood vessel;

applying a force on said proximal section of said first resorbable segment, said force causing the engagement of said second resorbable segment with the inner wall surface of the blood vessel, whereupon a portion of said first resorbable segment bridges the wall thickness;

sliding said third resorbable segment along said first resorbable segment to apply force to the outer wall surface of the blood vessel to produce tension in said first resorbable segment confined to the portion of said first resorbable segment bridging the wall thickness of the blood vessel.

18. The method of claim 17, wherein said second resorbable segment comprises an occlusion element which causes the sealing of the opening.

19. The method of claim 17, wherein said second resorbable segment comprises a spreadable element which causes the sealing of the opening.

20. The method of claim 17, wherein said first member comprises a sheath.